## Space Weather Forecast

Issued on Saturday, 18 May 2024 at 13:23 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Further Moderate-class flares likely with a slight chance of isolated Strong flares throughout. G1-G2 (Minor/Moderate) Storm conditions likely day 3 and 4 (20 and 21 May) with a chance of peak G3/Strong Storm intervals.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar activity returned to Moderate levels following a Moderate flare at 17/2108 UTC from the large sunspot region in the southeast. There are currently ten sunspots on the visible disc. Two small regions in the northeast decays and another region rotated over the northwest horizon. A new, simple region developed in the northeast disc. The largest and most actively flaring region on the disc lies in the southeast. The region is composed of a number of large, mature spots with several smaller spots of mixed polarity present, though these appear to evolve slowly. A region near centre-disc in the southern hemisphere is the next largest group and has been the source of some Common-class activity. Although the main lead and trailer regions are well-separated there are a number of small pores or spots of mixed polarity occupying the intermediate portion of the group. Another region in the southwest indicates modest magnetic complexity with numerous small spots at this time. The other sunspot regions are generally smaller, simpler and more stable.

The Moderate flare at 17/2108 UTC from the region in the southeast produced a Coronal Mass Ejection (CME) subsequently visible across all imagery. Analysis has been conducted on this CME and modelling suggests an arrival at Earth, most likely late day 3 (20 May) or perhaps very early day 4 (21 May).

**Solar Wind / Geomagnetic Activity:** A CME arrival was observed at 17/1240 UTC, with initially background to slightly elevated winds (around 380-420km/s) increasing to persistently slightly elevated levels around 460-490km/s following CME arrival. The Interplanetary Magnetic Field (IMF), Bt, was at moderate levels initially, and rose sharply following the CME arrival to peak at strong levels before steadily reducing to become weak by 18/1200 UTC. The important north-south component Bz was predominantly moderately negative following the CME arrival, steadily easing to become weakly negative by the end of the period. Geomagnetic activity varied between Quiet to G2/Moderate Storm levels.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) remained below the S1/Minor Radiation Storm levels on a slow decline, but above normal background levels.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Continued Low to Moderate activity is expected with isolated Moderate-class flares considered likely and a slight chance of isolated Strong flares. The moderately sized sunspot region in the southeast disc is most likely to be the source of significant flare activity.

**Solar Wind / Geomagnetic Activity:** There is an unlikely, but slight chance of a glancing impact from a CME late on day 1 (18 May) or early day 2 (19 May). A more notable CME arrival is expected at Earth late day 3 (20 May) or perhaps very early day 4 (21 May), resulting from the

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moderate flare of a region in the southeast disc that occurred late on 17 May.

In the absence of any CME arrivals solar winds are forecast to ease from slightly elevated levels to background speeds early in the period, with no significant coronal hole enhancements expected.

Quiet to Unsettled conditions are expected through the early period, with only a slight chance of Active to G1/Minor Storm conditions on days 1 and 2 (18 and 19 May) subject to the unlikely potential for a CME arrival. Confidence is greater for a more significant CME enhancement late day 3 (20 May) into day 4 (21 May) with G1-G2/Minor-Moderate (Kp5-6) activity likely and a chance of reaching G3/Strong (Kp7) levels of activity at peak. Activity should then subside towards Quiet to Unsettled levels again by the end of day 4 (21 May).

**Energetic Particles / Solar Radiation:** Solar radiation is below the S1/Minor Storm threshold, on a declining trend, but above normal background levels following recent flare activity. There is a persistent slight chance of further enhancements should any large flares occur, especially given the number of sunspot regions on the Earth-facing disc.

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**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | Yes | 10 | 5 | 70 | 70 |
| Strong | G3 | No | 1 | 1 | 20 | 20 |
| Severe | G4 | No | 1 | 1 | 5 | 5 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | Yes | 60 | 60 | 60 | 60 |
| Very Active | R3 to R5 X | No | 10 | 10 | 10 | 10 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 10 | 10 | 10 | 10 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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